LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

PART VI –C (ARCHIVES)

WATERBODY MANAGEMENT PLAN SERIES

CADDO LAKE

AQUATIC VEGETATION TYPE MAPS
AND NARRATIVES

APPENDIX III – Aquatic Vegetation Type Maps

Caddo Lake – Aquatic Vegetation Type Map and Narrative – 2006

Caddo Lake
Vegetation Type Map
2006

The vegetation type mapping survey was conducted by Louisiana Department of Wildlife and Fisheries employees on August 15th and August 16th 2006. Jeff Sibley and Todd Bridges identified the major aquatic plant species present in the lake and assessed the extent of coverage around the lake. At the time of the survey, the lake was at 167.75 NGVD, 2.25 feet below pool, and had an algal bloom that resulted in secchi disc readings of 14-18".

Species Present
The aquatic plant community on Caddo Lake is made up of the following species: water hyacinth (*Eichhornia crassipes*), fanwort (*Cabomba caroliniana*), coontail (*Ceratophyllum demersum*), hydrilla (*Hydrilla verticillata*), water primrose (*Ludwigia octovalvis*), water shield (*Brasenia schreberi*), Illinois pondweed (*Potamogeton illinoensis*), giant salvinia (*Salvinia molesta*), duckweed (*Lemna minor*), alligatorweed (*Alternanthera philoxeroides*), lizard's tail (*Saururus cernuus*), southern water-grass *(Luziola fluitans)*, large-flower primrose-willow *(Ludwigia grandiflora),* road-grass (*Eleocharis baldwinii*), water pennywort (*Hydrocotyle umbellata*), fragrant water lily (*Nymphaea odorata*), American lotus (*Nelumbo lutea*), frog's-bit (*Limnobium spongia*), arrowhead (*Sagittaria spp*.), variable-leaf milfoil (*Myriophyllum heterophyllum*), muskgrass (*Chara spp.)* and filamentous algae.

Severity
Aquatic vegetation covers nearly 2,200 acres or approximately 15% of the lake on the Louisiana side. Vegetation densities increase in the headwater areas such as Jeem's Bayou and as one continues west into Texas. In many areas of the lake just across the state line, access is limited to just the boat roads where boat traffic curtails encroachment from the vegetation. The lake has many shallow coves and pockets where the vegetation is worse and siltation is occurring in many of these areas. Eutrophication is occurring in the lake and the lack of drawdown capabilities and reduced water flow from the upstream Lake of the Pines is adding to the nutrient load problem.

The main lake area has little vegetation present due to wave action. Submerged vegetation could be found out to the 5' contour line below pool. The following invasive species are present on the lake: water hyacinth (*Eichhornia crassipes*), hydrilla (*Hydrilla verticillata*), and giant salvinia (*Salvinia molesta*). Giant salvinia (*Salvinia molesta*) is primarily found in the Jeem's Bayou area north of Plum Point, but was found in three new areas during this survey: Rice's pocket, Hawley's arm, and near Jap Island. This plant poses the largest threat to the lake, because it can be spread so easily. Water hyacinth (*Eichhornia crassipes*) is generally found in conjunction with other plants and are at low densities in most areas. Water hyacinth (*Eichhornia crassipes*) does pose a large problem on the Texas side of the lake. Hydrilla (*Hydrilla verticillata*) and other submerged vegetation is severe in the upper reaches of Jeem's Bayou and several small pockets around the lake, but wave action and turbidity should prevent it from "threatening" the

entire lake. American lotus (*Nelumbo lutea*) can cause problems in many local areas. There are some large populations near the Williamson Park area and these plants are very dense in Buzzard Bay and the state line area.

Vegetation Management

With three invasive, exotic species (water hyacinth (*Eichhornia crassipes*), hydrilla (*Hydrilla verticillata*) and giant salvinia (*Salvinia molesta*) Caddo Lake is a waterbody that will require regular monitoring and treatment of aquatic vegetation. The lake does not have a control structure which offers the capabilities for water level manipulation. There has also been concerns expressed with the watershed and that Caddo Lake does not receive the flow of water it once did since the construction of Lake of the Pines in Avinger, TX. Limited "flushing" action now occurs and there is a substantial build up of organic silt over much of the lake's bottom.

Given the above reasons, vegetation control options on Caddo Lake are somewhat limited. An integrated pest management plan consisting of herbicide treatments, biological control methods and public education should be the best choice to help control aquatic weed problems on the lake.

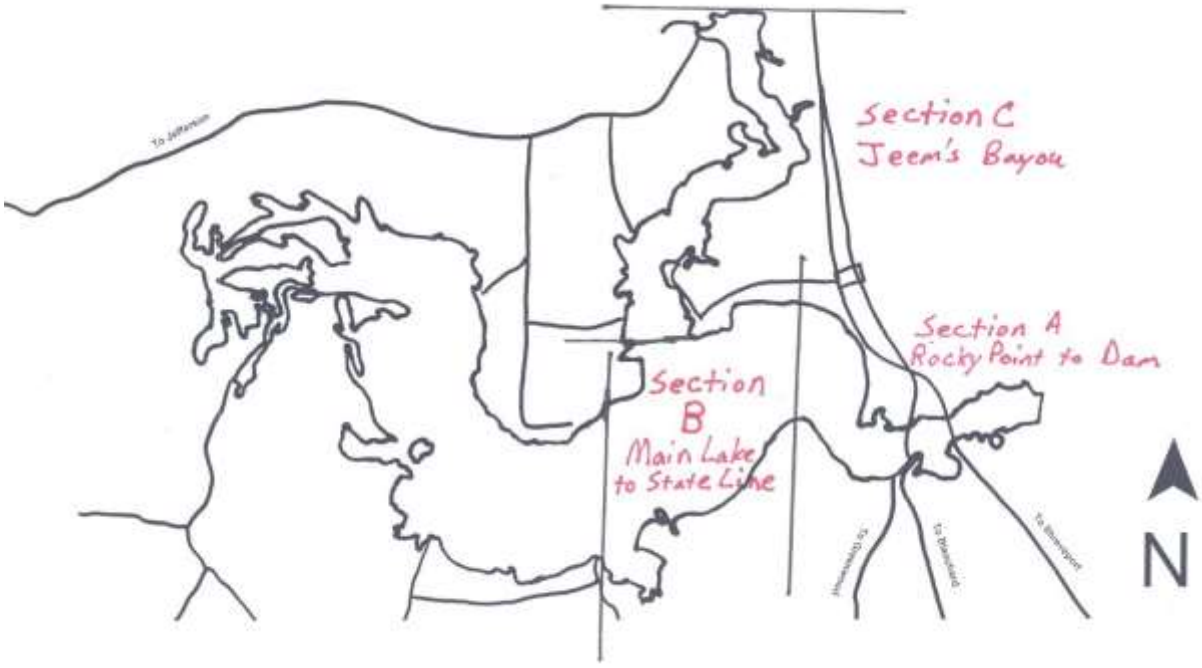
Herbicide applications have been made on a regular basis for the control of water hyacinth (*Eichhornia crassipes*) and giant salvinia (*Salvinia molesta*) since the salvinia was first discovered on the lake in June 2006. At the time of this document (10-24-06), the giant salvinia (*Salvinia molesta*) population has been held in check through LDWF's herbicide efforts. There is approximately 250-300 acres of giant salvinia (*Salvinia molesta*) on the Louisiana side of the lake. This infestation is located primarily in the Jeem's Bayou area. As new infestations have been found in both states, these areas have been treated with herbicides. Giant salvinia (*Salvinia molesta*) has been found in areas south of Jeem's Bayou where it likely drifted from wind. Jeem's Bayou appears to be the area of the oldest infestation. Giant salvinia (*Salvinia molesta*) has also been found in the Kitchen Creek area in Texas. This infestation is likely from a different source than drift and could lead to infesting other areas of the lake. Dense vegetation and trees make herbicide applications and finding small plants more difficult.

The use of the salvinia weevil (*Cyrtobagous salviniae*) could prove critical in controlling mats of salvinia in certain areas. There are many extremely shallow areas of the lake where salvinia is present. Herbicide applications are nearly impossible in these areas to eradicate the plants. Weevils could be used control these plants if the area is not treated with herbicides and the weevils are allowed to multiply. Weevils could also be utilized in areas around potable water intakes where herbicides cannot be used easily. Currently, there is only one area on Caddo lake that has a population of salvinia around a potable intake (town of Vivian intake 32° 47' 32.02"N, 93° 59' 53.57" W). There are several other intakes on the lake that could be at risk in the future.

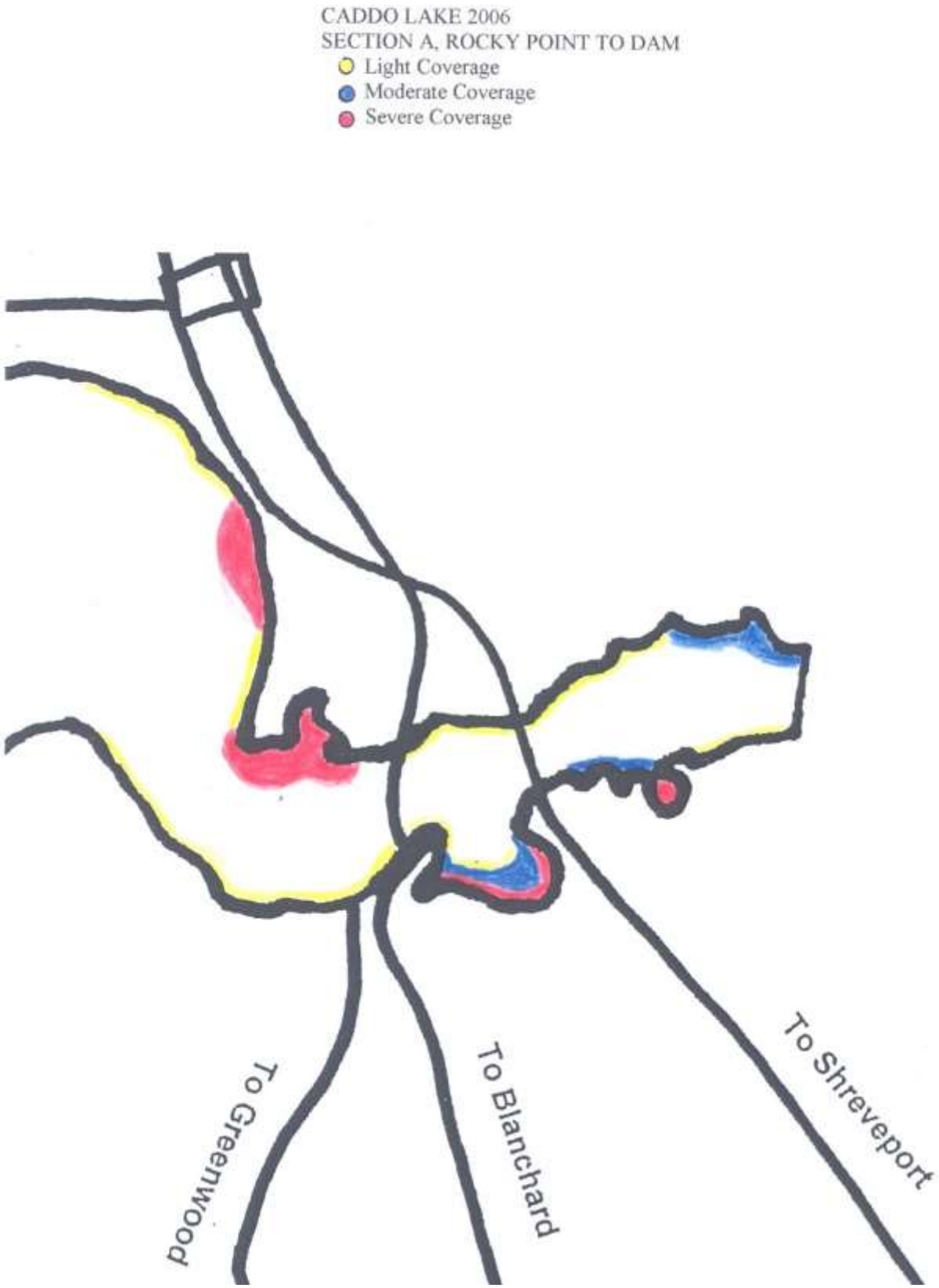
Perhaps the most critical step in the management plan is increasing public awareness of giant salvinia and how to prevent the spread of invasive species.

Above narrative edited and corrected by James Seales, July 2013.

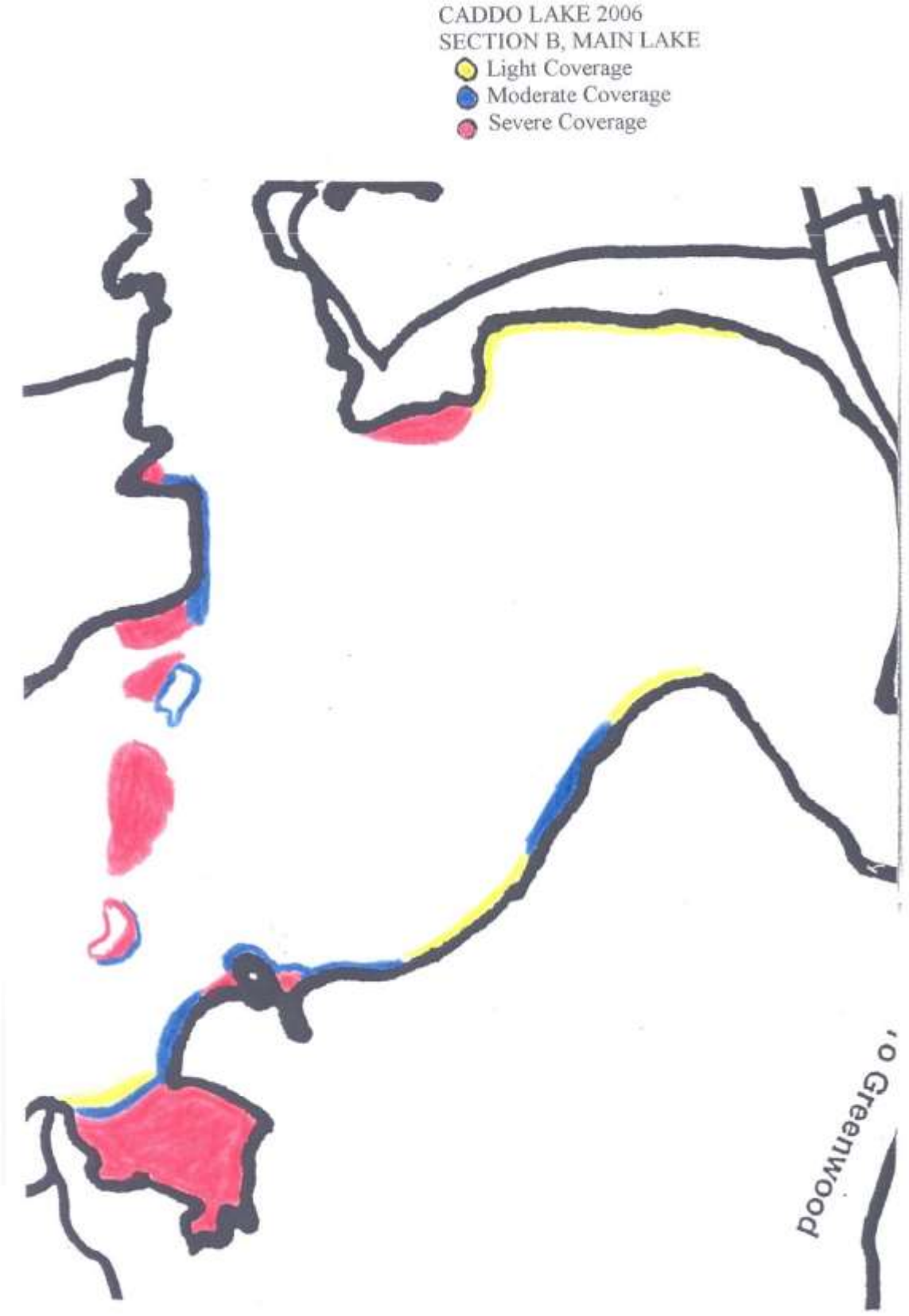
2006 Caddo Lake Type Map Key



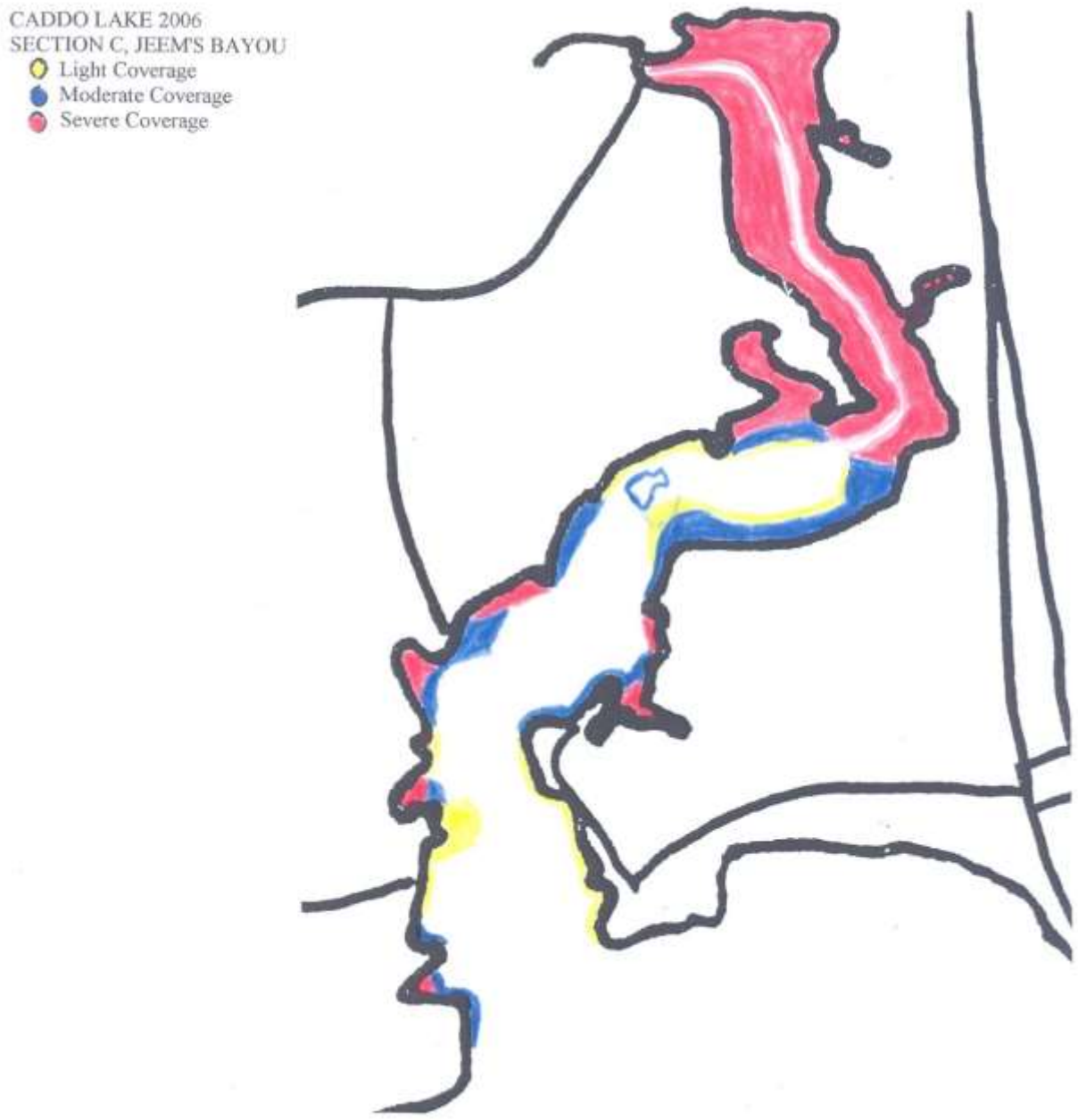
2006 Caddo Lake Type Map – Section A



2006 Caddo Lake Type Map – Section B



2006 Caddo Lake Type Map – Section C



Caddo Lake
Vegetation Type Map
2007

The vegetation type mapping survey was conducted by Louisiana Department of Wildlife and Fisheries employees in early August 2007. Jeff Sibley identified the major aquatic plant species present in the lake and assessed the extent of coverage around the lake. At the time of the survey, the lake was at 169.74 NGVD, or 0.26 feet below pool stage. Secchi disc readings ranged from 14-18".

Species Present

The aquatic plant community on Caddo Lake is made up of the following species: water hyacinth (*Eichhornia crassipes*), fanwort (*Cabomba caroliniana*), coontail (*Ceratophyllum demersum*), hydrilla (*Hydrilla verticillata*), water primrose (*Ludwigia octovalvis*), water shield (*Brasenia schreberi*), Illinois pondweed (*Potamogeton illinoensis*), giant salvinia (*Salvinia molesta*), common duckweed (*Lemna minor*), alligator-weed (*Alternanthera philoxeroides*), lizard's tail (*Saururus cernuus*), southern water-grass *(Luziola fluitans),* large-flower primrose-willow *(Ludwigia grandiflora),* road-grass (*Eleocharis baldwinii*), water pennywort (*Hydrocotyle umbellate*), spatterdock (*Nuphar luteum),* fragrant water lily (*Nymphaea odorata*), American lotus (*Nelumbo lutea*), frog's-bit (*Limnobium spongia*), arrowhead (*Sagittaria spp*.), variable-leaf milfoil (M*yriophyllum heterophyllum*), muskgrass (*Chara spp.)* and filamentous algae.

Severity

Aquatic vegetation covers nearly 2,200 acres or approximately 15% of the lake on the Louisiana side. Vegetation densities increase in the headwater areas such as Jeem's Bayou and as one continues west into Texas. In many areas of the lake just across the state line, access is limited to just the boat roads where boat traffic curtails encroachment from the vegetation. The lake has many shallow coves and pockets where the vegetation is worse and siltation is occurring in many of these areas. Eutrophication is occurring in the lake and the lack of drawdown capabilities and reduced water flow from the upstream Lake of the Pines is adding to the nutrient load problem.

The main lake area has little vegetation present due to wave action and turbidity. Submerged vegetation was found out to the 5'contour line below pool. Exotic, invasive plant species pose a severe threat to the aquatic habitat of Caddo Lake. Hydrilla (*Hydrilla verticillata*), water hyacinth (*Eichhornia crassipes*) and giant salvinia (*Salvinia molesta*) are all present on the lake and have the potential to cause many problems. Hydrilla (*Hydrilla verticillata*) is currently in low densities on the Louisiana side of the lake and is not presently causing any access problems. Hydrilla (*Hydrilla verticillata*) has been present on the lake for several years. Hydrilla (*Hydrilla verticillata*) densities have cycled from year to year depending upon many factors. Wave action and turbidity should prevent it from threatening the entire lake. Water hyacinth (*Eichhornia crassipes*) are generally found in conjunction with other floating or emergent vegetation and are at low densities in most areas. Water hyacinth (*Eichhornia crassipes*) do pose a large problem in

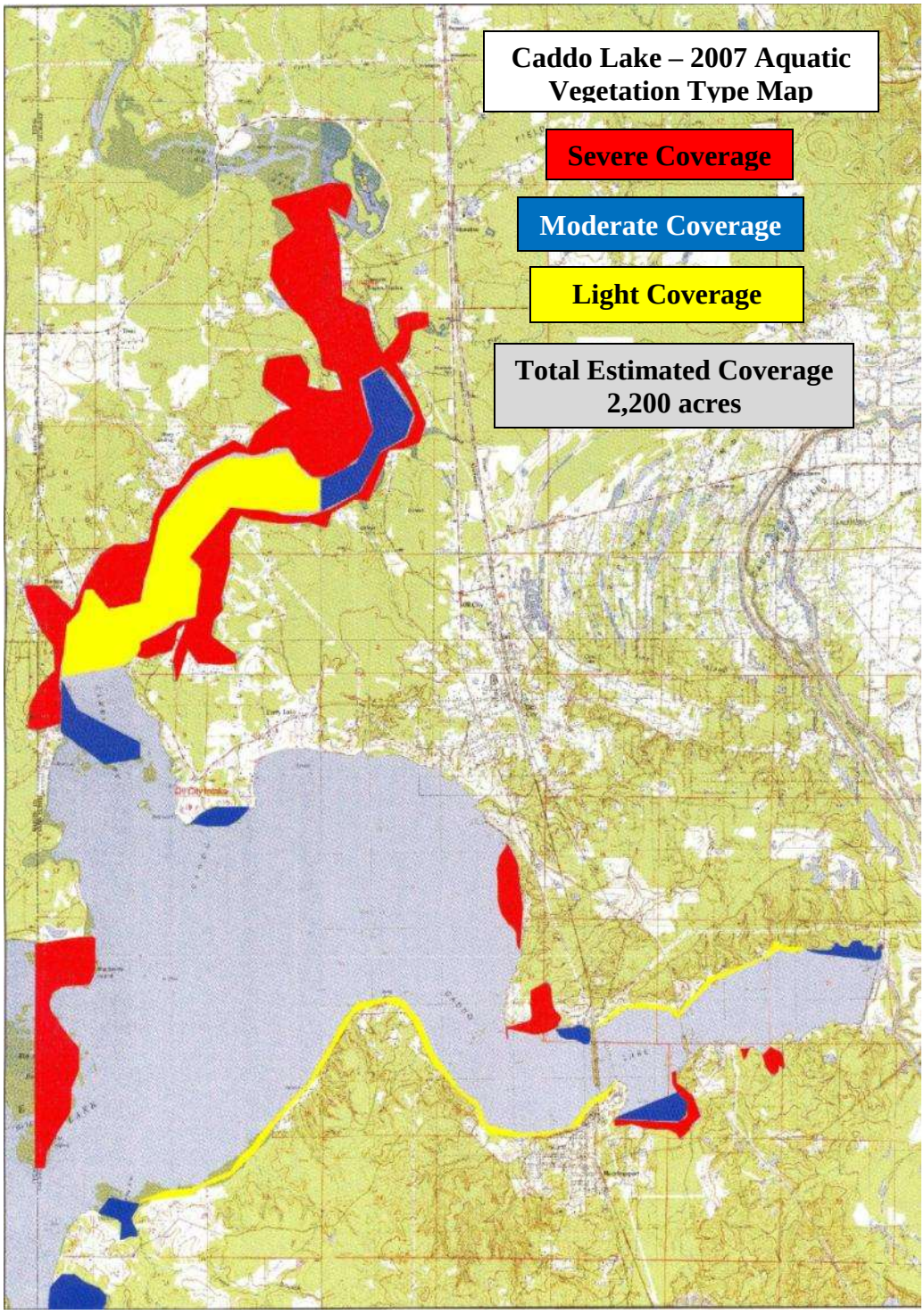
many areas in Texas and densities do increase as one travels westward near the state line. Back water areas near Big Green Brake, Tar Island, etc. hold high densities of water hyacinth (*Eichhornia crassipes*) mixed with giant salvinia (*Salvinia molesta*).

American lotus (*Nelumbo lutea*) can cause problems in many local areas of Caddo Lake. Historically there have been large populations present near Williamson Park, in Buzzard Bay, and along the state line. These populations were not as severe in 2007 as 2006 and can likely be attributed to a high water event in July 2007 which created strong currents and turbidity that may have impacted the American lotus (*Nelumbo lutea*) plants as they were starting to emerge.

Giant salvinia (*Salvinia molesta*) was first identified on the lake in 2006 and was located in Jeem's Bayou area. Winds and high water events have flushed giant salvinia (*Salvinia molesta*) out into other areas of the lake, but as of yet, the plants have not formed any large mats on lower portions of the lake. Giant salvinia (*Salvinia molesta*) in the main lake portions of Caddo are concentrated in extremely shallow protected waters and at low densities. It can be expected that these populations will expand on lower portions, such as below Mooringsport bridge where waters are more protected. Giant salvinia (*Salvinia molesta*) concentrations are highest in Jeem's Bayou and in the cypress brakes along the state line. Giant salvinia (*Salvinia molesta*) was estimated to cover 600 acres.

Above narrative edited and corrected by James Seales, July 2013.

2007 Caddo Lake Type Map



Caddo Lake
Vegetation Type Map
2009

The vegetation type mapping survey was conducted by Louisiana Department of Wildlife and Fisheries employees in September of 2009. Kevin Houston identified the major aquatic plant species present in the lake and assessed the extent of coverage around the lake. At the time of the survey, the lake was at 168.88 NGVD, or 1.12 feet below pool stage. Secchi disc readings ranged from 14-18".

Species Present

The aquatic plant community on Caddo Lake is made up of the following species: water hyacinth (*Eichhornia crassipes*), fanwort (*Cabomba caroliniana*), coontail (*Ceratophyllum demersum*), hydrilla (*Hydrilla verticillata*), water primrose (*Ludwigia octovalvis*), water shield (*Brasenia schreberi*), Illinois pondweed (*Potamogeton illinoensis*), giant salvinia (*Salvinia molesta*), common duckweed (*Lemna minor*), alligator-weed (*Alternanthera philoxeroides*), lizard's tail (*Saururus cernuus*), southern water-grass (*Luziola fluitans*), large-flower primrose-willow *(Ludwigia grandiflora)*, road-grass (*Eleocharis baldwinii*), water pennywort (*Hydrocotyle umbellata*), spatterdock (*Nuphar luteum)*, fragrant waterlily (*Nymphaea odorata*), American lotus (*Nelumbo lutea*), frog's-bit (*Limnobium spongia*), arrowhead (*Sagittaria spp*.), variable-leaf milfoil (*Myriophyllum heterophyllum*), muskgrass (*Chara spp.), and* filamentous algae.

Severity

Aquatic vegetation covers nearly 2,150 acres or approximately 15% of the lake on the Louisiana side. Vegetation densities increase in the headwater areas such as Jeem's Bayou and as one continues west into Texas. In many areas of the lake just across the state line, access is limited to just the boat roads where boat traffic curtails encroachment from the vegetation. The lake has many shallow coves and pockets where the vegetation is worse and siltation is occurring in many of these areas. Eutrophication is occurring in the lake and the lack of drawdown capabilities and reduced water flow from the upstream Lake of the Pines is adding to the nutrient load problem.

The main lake area has little vegetation present due to wave action and turbidity. Submerged vegetation comprises most of the aquatic plant coverage. Most severe cases are the northernmost sections of Jeem's Bayou. Fanwort (*Cabomba caroliniana*) and coontail (*Ceratophyllum demersum*) cover approximately 700 acres in this region. The middle portion of Jeem's Bayou has a moderate amount of submerged aquatics with most found near the shoreline.

Exotic, invasive plant species pose a severe threat to the aquatic habitat of Caddo Lake. Hydrilla (*Hydrilla verticillata*), water hyacinth (*Eichhornia crassipes*) and giant salvinia (*Salvinia molesta*) are all present on the lake and have the potential to cause many problems.

Hydrilla (*Hydrilla verticillata*) has been present on the lake for several years, and densities have cycled from year to year. Hydrilla (*Hydrilla verticillata*) is making a comeback in the State Line, Big Green Break, and Jap Island areas with large amounts of topped out mats surrounding

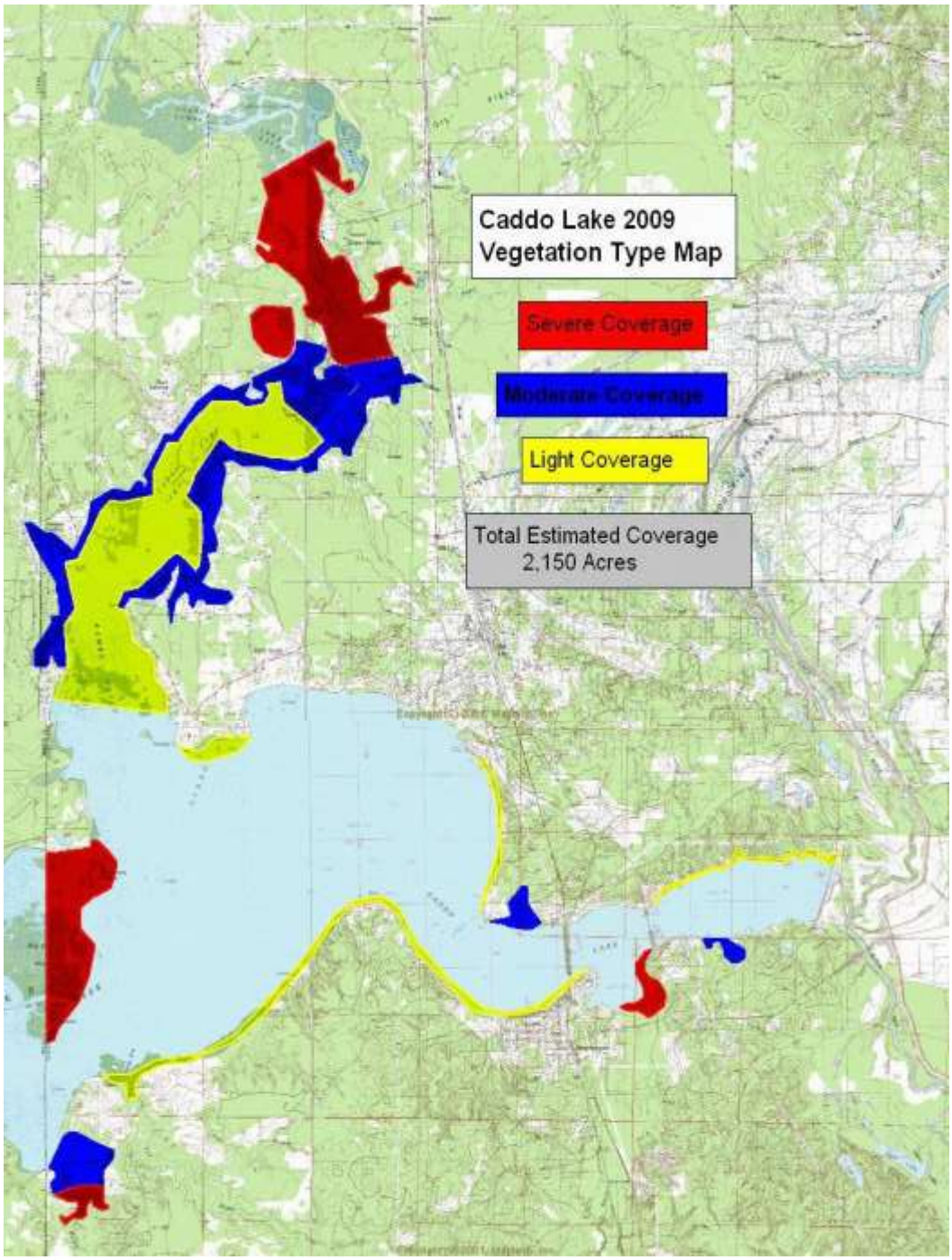
these island areas. Wave action and turbidity should prevent it from threatening the entire lake.

Floating vegetation, particularly water hyacinth (*Eichhornia crassipes*) and giant salvinia (*Salvinia molesta*), have been reduced by major flooding action that occurred in the spring. This flooding activity created a current in the Jeem's Bayou area which cleared much of the open water areas. Giant salvinia still continues to thrive in the low lying, backwater areas; however, Caddo Lake seems to have some self-regulating qualities in defense of floating aquatic vegetation. Once plants are pushed in to open water areas, wind action creates large bands of rolled up vegetation along the bank. These bands of vegetation break down over time. Giant salvinia (*Salvinia molesta*)and water hyacinth (*Eichhornia crassipes*) cover approximately 500 acres on the Louisiana side of the lake. Both giant salvinia (*Salvinia molesta*) and water hyacinth (*Eichhornia crassipes*) continue to expand on the Texas side of the lake.

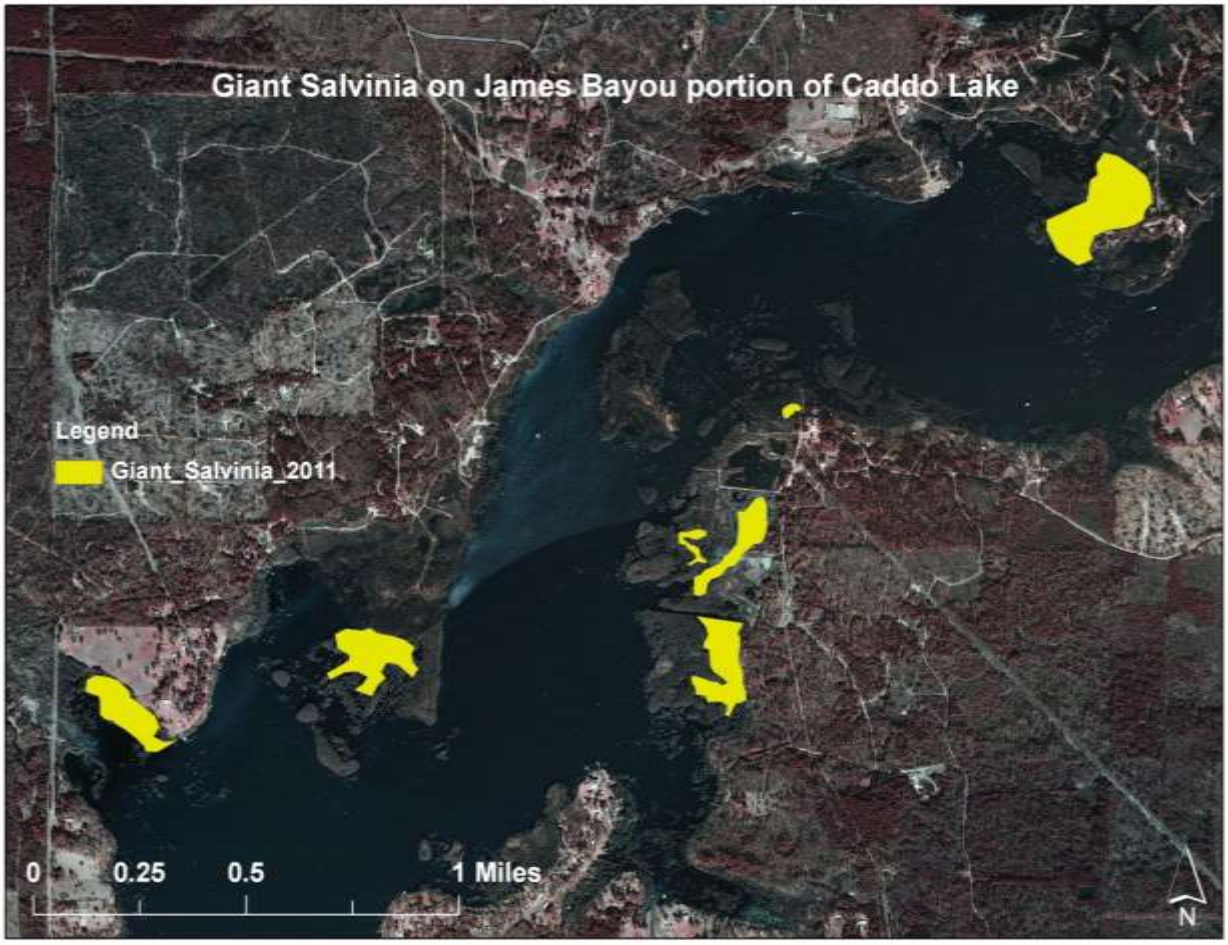
American lotus (*Nelumbo lutea*) can cause problems in many local areas of Caddo Lake. Historically there have been large infestations present near Williamson Park, in Buzzard Bay, and along the state line. As noted in the 2006 & 2007 type map surveys, these areas of infestation have continued to decline. A couple of larger areas of American lotus (*Nelumbo lutea*) can be found in Thompson's Arm and Little Green Break.

Above narrative edited and corrected by James Seales, July 2013.

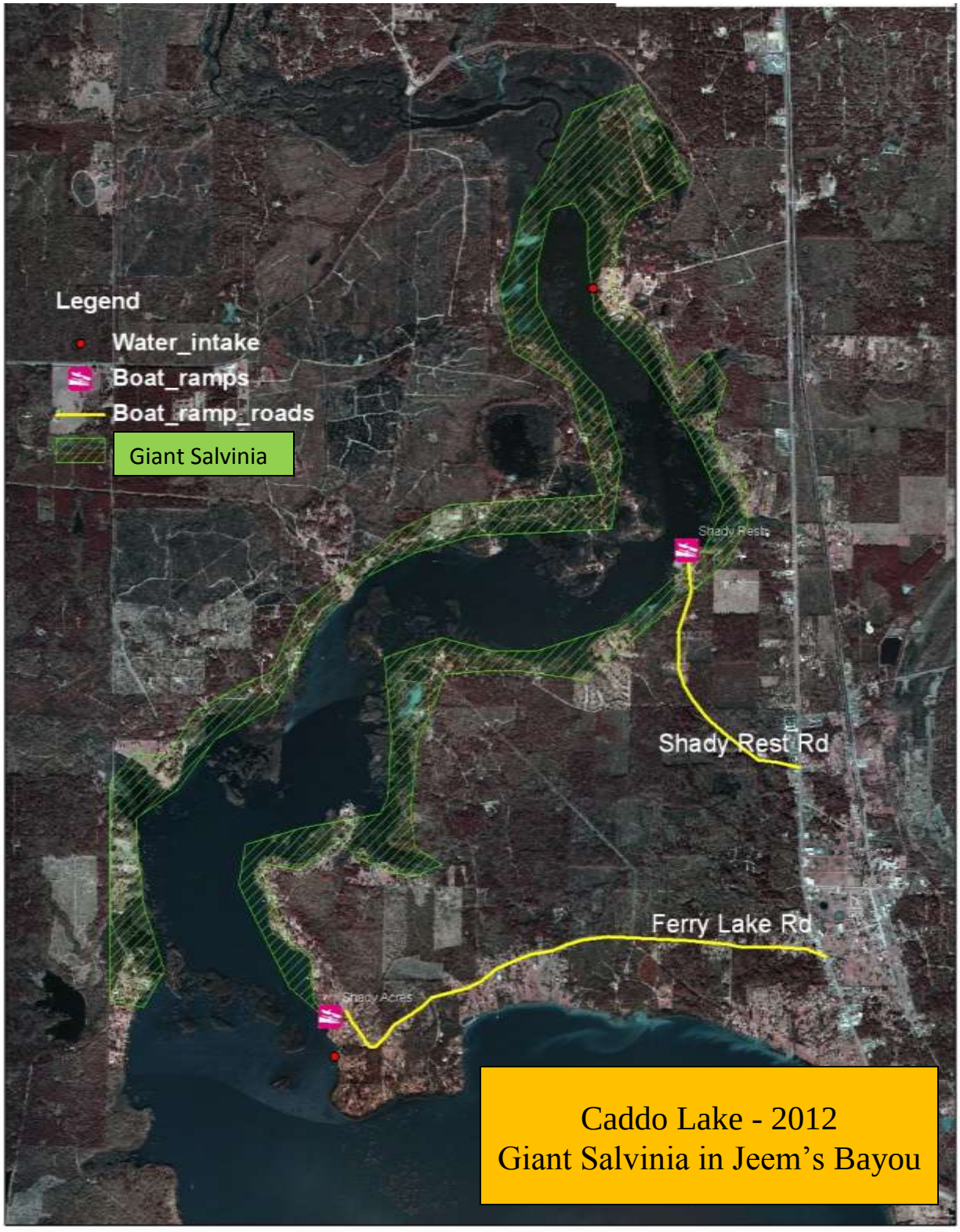
2009 Caddo Lake Type Map



2011 Caddo Lake Type Map



2012 Caddo Lake Type Map – Giant Salvinia in Jeem's Bayou



2012 Caddo Lake Type Map – American Lotus on Lower End of Lake

Aquatic Vegetation Type Maps

2013 Caddo Lake Type Map